WE CLAIM:

1. A heat exchanger, comprising:

a plurality of tubes carrying a first fluid, said tubes running parallel to each other, each of said tubes being separated by a space there between;

said plurality of tubes arranged to have a cross-sectional shape with a first side and a second opposite side;

at least one layer of thermal buffer members on said first side of said tubes, said at least one layer arranged in a direction parallel to said tubes, each of said thermal buffer members being separated by a space there between; and

a second fluid passing from said first side to said second side of said plurality of tubes, by first moving around the exterior of said thermal buffer members then by moving past an exterior of said plurality of tubes.

2. The heat exchanger according to claim 1, wherein said at least one layer of thermal buffer members is one layer of thermal buffer members.

3. The heat exchanger according to claim 1, wherein said at least one layer of thermal buffer members is at least two layers of thermal buffer members.

4. The heat exchanger according to claim 1, wherein:

said at least one layer of thermal buffer members is two layers of thermal buffer members; and

said thermal buffer members are composed of a metal.

5. The heat exchanger according to claim 1 wherein:

said first fluid is relatively cool compressor air; and

said second fluid is engine hot exhaust gas.

6. The heat exchanger according to claim 1 wherein:

said second fluid is hot engine bleed air; and

said first fluid is cool air, relative to said second fluid.

7. The heat exchanger according to claim 1, wherein said tubes and said thermal buffer members are disposed in a linear arrangement.

8. The heat exchanger according to claim 1 wherein:

said plurality of tubes has a first set of tubes and a second set of tubes running parallel to said first set of tubes;

said first set of tubes contacting said second fluid prior to said second set of tubes; and

said first set of tubes having a diameter larger than said second set of tubes.

9. The heat exchanger according to claim 8, further comprising:

an inner bundle of tubes, said inner bundle of tubes having said first set of tubes and said second set of tubes;

an outer bundle of tubes, said outer bundle of tubes having said first set of tubes and said second set of tubes; and

said first fluid passing through the interior of said outer bundle of tubes and then being directed through he interior of said inner bundle of tubes.

10. The heat exchanger according to claim 1, further comprising:

at least one tube support baffle having holes therein, through which said tubes and said thermal buffer members traverse; and

a spacer support tube, passing through and engaged to said tube support baffle, for supporting and spacing apart said tube support baffle to one another.

11. The heat exchanger according to claim 1, further comprising a gap in the longitudinal direction of said thermal buffer members, said gap being sufficient size to allow for thermal expansion of said thermal buffer members without exerting stress on said heat exchanger.

12. The heat exchanger according to claim 1, wherein:

said plurality of tubes and said at least one layer of thermal buffer members both have an annular cross-sectional shape, thereby forming said heat exchanger in an overall annular shape;

said at least one layer of thermal buffer members being concentrically disposed inside said annular cross-sectional shape of said plurality of tubes; and

said second fluid passing from an inner region of said annular shape to an exterior of said annular shape first through said at least one layer of thermal buffer members then through said plurality of tubes.

13. A heat exchanger, comprising:

a plurality of tubes carrying a first fluid internally, said tubes running parallel to each other, each of said tubes being separated by a space there between;

said plurality of tubes arranged to have a cross-sectional shape with a first side and a second side;

at least one layer of solid thermal buffer members on said first side of said tubes, said at least one layer arranged in a direction parallel to said tubes, each of said thermal buffer members being separated by a space there between;

a second fluid passing from said first side to said second side of said plurality of tubes, by first moving around said solid thermal buffer members then by moving past an exterior of said plurality of tubes; and

a gap in a longitudinal direction of each of said solid thermal buffer members located either within said thermal buffer members, thereby creating two thermal buffer members along said longitudinal direction separated by said gap, or at and end of said thermal buffer members, between said thermal buffer members and said heat exchanger, said gap being sufficient size to allow for thermal expansion of said thermal buffer members without exerting stress on said heat exchanger.

14. The heat exchanger according to claim 13, wherein:

said at least one layer of solid thermal buffer members is two layers of solid thermal buffer members; and

said solid thermal buffer members are composed of a metal.

15. The heat exchanger according to claim 14, wherein said metal is a nickel/molybdenum/chromium alloy.

16. The heat exchanger according to claim 13, wherein:
said first fluid is relatively cool compressor air; and
said second fluid is engine hot exhaust gas.

17. The heat exchanger according to claim 13, wherein:
said second fluid is hot engine bleed air; and
said first fluid is cool air relative to said second fluid.

18. The heat exchanger according to claim 13, further comprising:
an inner bundle of tubes arranged in a circular configuration, said inner bundle of tubes having a first set of tubes and a second set of tubes running parallel to said first set of tubes;
an outer bundle of tubes arranged in a circular configuration ~~of~~ concentric with the configuration of said inner bundle of tubes, but having a greater diameter, said outer bundle of tubes having said first set of tubes and said second set of tubes;
said first set of tubes of each of said inner bundle and outer bundle contacting said second fluid prior to said second set of tubes; and
said first set of tubes having a diameter larger than said second set of tubes.

19. The heat exchanger according to claim 13, further comprising:
at least two tube support/baffles having holes therein, through which said tubes and said thermal buffer members transverse; and
a spacer support tube, passing through and attached to said tube support/baffles, for supporting and spacing apart said tube support/baffles.

20. A heat exchanger for transferring energy from a second fluid to a first fluid, comprising:

a first set of tubes disposed adjacent to and running parallel with a second set of tubes, each of said first set of tubes and said second set of tubes carrying said first fluid;

at least two layers of solid thermal buffer members on one side of said first set of tubes, arranged in a direction parallel to said first and second set of tubes;

a gap in a longitudinal direction of said solid thermal buffer members, located either within said thermal buffer members, thereby creating two thermal buffer members along said longitudinal direction separated by said gap, or at an end of said thermal buffer members, between said thermal buffer members and said heat exchanger, said gap being sufficient size to allow for thermal expansion of said thermal buffer members without exerting stress on said heat exchanger;

said second fluid passing first around said solid thermal buffer members then over an exterior of said first set of tubes, then over an exterior of said second set of tubes; and

said first set of tubes having a diameter larger than said second set of tubes.

21. The heat exchanger according to claim 20, wherein:

said at least two layers of solid thermal buffer members is two layers of solid thermal buffer members; and

said solid thermal buffer members are composed of a metal.

22. The heat exchanger according to claim 20, wherein:
said first fluid is relatively cool compressor air; and
said second fluid is engine hot exhaust gas.

23. The heat exchanger according to claim 20, wherein:
said second fluid is hot engine bleed air; and
said first fluid is cool air, relative to said second fluid.

24. The heat exchanger according to claim 20, further comprising:
an inner bundle of tubes, said inner bundle of tubes having said first set of tubes and said second set of tubes; and
an outer bundle of tubes, said outer bundle of tubes having said first set of tubes and said second set of tubes;
where in said heat exchanger is of an annular shape, wherein said second fluid passes from an inner region of said annular shape to an exterior of said annular shape first through said thermal buffer members then through said inner bundle of tubes, then through said outer bundle of tubes.

25. The heat exchanger according to claim 20, further comprising:
at least two tube support/baffles having holes therein, through which said tubes and said thermal buffer members transverse; and
a spacer support tube, passing through and attached to said tube support/baffles, for supporting and spacing apart said tube support/baffles.

26. A heat exchanger for transferring energy from a second fluid to a first fluid, comprising:

a first set of linear tubes disposed adjacent to and running parallel with a second set of linear tubes, each of said first set of tubes and said second set of tubes carrying said first fluid;

each of said linear tubes in said first set of linear tubes being arranged with a space there between;

at least two layers of linear, solid, rod-shaped thermal buffer members on one side of said first set of linear tubes, arranged in a direction parallel to said first and second set of linear tubes;

each of said thermal buffer members in said at least two layers being arranged with a space there between;

a gap in the longitudinal direction of said solid thermal buffer members located either within said thermal buffer members, thereby creating two thermal buffer members along said longitudinal direction separated by said gap, or at an end of said thermal buffer members, between said thermal buffer members and said heat exchanger, said gap being sufficient size to allow for thermal expansion of said thermal buffer members without exerting stress on said heat exchanger;

at least one tube support baffle having holes therein, through which said tubes and said solid thermal buffer members traverse;

said holes having a diameter larger than a diameter of said thermal buffer members;

a spacer support tube, passing through and attached to said tube support/baffles, for supporting and spacing apart said tube support/baffles;

said first set of linear tubes having a diameter larger than said second set of linear tubes;

an inner bundle of tubes, said inner bundle of tubes having said first set of linear tubes and said second set of linear tubes;

an outer bundle of tubes, said outer bundle of tubes having said first set of linear tubes and said second set of linear tubes; and

said heat exchanger is of an annular shape, wherein said second fluid passes from an inner region of said annular shape to an exterior of said annular shape first through said thermal buffer members then through said inner bundle of tubes, then through said outer bundle of tubes.

27. A method for transferring energy from a second fluid to a first fluid, comprising:

passing said second fluid through a plurality of tubes;

arranging at least one layer of thermal buffer members on one side of said tubes in a direction parallel to said tubes; and

passing said first fluid first around said thermal buffer members then over an exterior of said plurality of tubes.

28. The method according to claim 27, further comprising arranging two layers of thermal buffer members as said at least one layer of thermal buffer members.

29. The method according to claim 27, further comprising:

choosing relatively cool compressor air as said second fluid; and

choosing engine hot exhaust gas as said first fluid.

30. The method according to claim 27, further comprising:

arranging said plurality of tubes as a first set of tubes and a second set of tubes running parallel to said first set of tubes, said first set of

tubes contacting said second fluid prior to said second set of tubes, and said first set of tubes having a diameter larger than said second set of tubes.

31. The method according to claim 27, further comprising:

disposing at least two tube support/baffles, having holes therein, through which said tubes and said thermal buffer members traverse; and

passing through and attaching a spacer support tube to said at least two tube support/baffles to support and space apart said tube support/baffles.

32. The method according to claim 27, further comprising providing a gap in the longitudinal direction of said thermal buffer members, said gap being sufficient size to allow for thermal expansion of said thermal buffer members without exerting stress on said heat exchanger.

33. A method for transferring energy from a second fluid to a first fluid, comprising:

passing said second fluid through an interior of a heat exchanger;

arranging at least one layer of thermal buffer members on one side of said heat exchanger; and

passing said first fluid first around said thermal buffer members then over an exterior of said heat exchanger.